

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (currently amended) A counterfeit eye discrimination method comprising the steps of:

capturing, by a capturing device, a single image from a living eye or a photocopy of a living eye that is positioned outside the capturing device;

receiving image data of the single image and storing the image data on a memory device;

detecting presence or absence of static textual roughness in the single image by image processing to the image data; and

wherein the single image is judged to have been captured from a photocopy of a living eye when the static textual roughness is detected in the image.

wherein the image processing includes the steps of:

performing band limitation to the image data; and

extracting a predetermined feature from the band-limited image data.

wherein the presence or absence of the static textual roughness is detected using the extracted feature data;

wherein the predetermined feature is one of or a combination of two or more of moment, central moment, skewness and kurtosis of pixel values.

2 – 3. (cancelled)

4. (currently amended) The counterfeit eye discrimination method of Claim 1[[2]],

wherein pixel coordinate values are used in combination with pixel values in the extraction of the predetermined feature.

5. (currently amended) The counterfeit eye discrimination method of Claim 1[[2]],

wherein a center of a pupil or an iris is used in combination with pixel values in the extraction of the predetermined feature.

6. (currently amended) The counterfeit eye discrimination method of Claim 1[[2]],

wherein a high-pass filter or a band-pass filter is used in the band limitation.

7. (currently amended) The counterfeit eye discrimination method of Claim 1[[2]],

wherein the extraction of the predetermined feature is performed to a vicinity of an iris region or a pupil region.

8. (currently amended) The counterfeit eye discrimination method of Claim 1[[2]],

wherein the extraction of the predetermined feature is performed to a region on or in a vicinity of a line passing through a center of a pupil or a center of an iris.

9. (currently amended) The counterfeit eye discrimination method of Claim 1, wherein the image processing includes the steps of:
performing frequency analysis to the image data;
extracting [[a]] the predetermined feature from the frequency-analyzed data.

10. (currently amended) A counterfeit eye discrimination method comprising the steps of:

capturing a single image from a living eye or a photocopy of a living eye;
receiving image data of the single image and storing the image data on a memory device;
performing band limitation to the whole image data of the single image;
extracting a predetermined feature from the band-limited image data, the predetermined feature being one of or a combination of two or more of moment, central moment, skewness and kurtosis of pixel values; and
recognizing whether the single image has been captured from a photocopy of a living eye based on data of the extracted feature.

11. (previously presented) The counterfeit eye discrimination method of Claim 10,
wherein in the recognition step,

distributions of the predetermined feature of images captured from a living eye and images captured from a photocopy of a living eye are respectively prepared beforehand,

a distance to data of the extracted feature from the feature distribution of the images captured from a living eye and a distance thereto from the feature distribution of the images captured from a photocopy of a living eye are calculated, and

the single image is judged to have an eye belonging to the distribution, from which the calculated distance is the shorter between a living eye and a photocopy of a living eye.

12. (currently amended) A counterfeit eye discrimination device comprising:

an image input section that inputs image data of a single image captured from a living eye or a photocopy of a living eye;

a band limitation section that performs band limitation to the whole image data of the single image;

a feature extraction section that extracts a predetermined feature from the image data processed by the band limitation section, the predetermined feature being one of or a combination of two or more of moment, central moment, skewness and kurtosis of pixel values; and

a recognition section that recognizes whether the single image has been captured from a photocopy of a living eye based on data of the feature extracted by the feature extraction section.

13. (currently amended) A computer-readable medium encoded with a program allowing a computer to execute the steps of:

capturing a single image from a living eye or a photocopy of a living eye and storing image data of the single image on a memory device;

performing band limitation to the whole image data of the single image;

extracting a predetermined feature from the band-limited image data, the predetermined feature being one of or a combination of two or more of moment, central moment, skewness and kurtosis of pixel values; and

recognizing whether the single image has been captured from a photocopy of a living eye based on data of the extracted feature.

14. (original) An iris authentication method comprising the steps of:

performing iris authentication based on image data of an image including an eye;
and

performing the counterfeit eye discrimination method of Claim 1 or Claim 10 to the image data when a subject is authenticated as a person himself or herself in the iris authentication step.

15. (currently amended) A counterfeit printed matter discrimination method, characterized by comprising the steps of:

capturing a single image from a bill or valuable paper;

receiving image data of the single image and storing the image data of the single image on a memory device; and

detecting presence or absence of static textual roughness in the single image by image processing to the image data, the image processing including a step of extracting one of or a combination of two or more of moment, central moment, skewness and kurtosis of pixel values as a predetermined feature.

wherein the bill or the valuable paper is judged to be a counterfeit printed matter when roughness is detected in the image.

16. (currently amended) An image discrimination method comprising the steps of:

capturing a single image from an object or a printed matter imitating the object;
receiving image data of the single image and storing the image data of the single image on a memory device; and

detecting presence or absence of static textual roughness in the single image by image processing to the image data, the image processing including a step of extracting one of or a combination of two or more of moment, central moment, skewness and kurtosis of pixel values as a predetermined feature.

wherein the single image is judged to have been captured from a printed matter imitating the object when the static textual roughness is detected in the image.

17. (previously presented) The counterfeit eye discrimination method of claim 1, further comprising performing an authentication operation in response to the judgment.

18. (previously presented) The counterfeit eye discrimination method of claim 1, wherein the image data of the single image include pixel values, wherein a statistical variance of the pixel values conclusively determines the static textual roughness.

19. (previously presented) The counterfeit eye discrimination method of claim 1, wherein the static textual roughness is on the surface of the photocopy.

20. (previously presented) The counterfeit eye discrimination method of claim 1, wherein the static textual roughness has characteristics indicating association with a photocopy produced by an ink or toner on a printer output.

21. (previously presented) The counterfeit eye discrimination method of claim 1, wherein the static textual roughness is of intensity data of the single image.

22. (previously presented) The counterfeit eye discrimination method of claim 1, wherein the static textual roughness has characteristics indicating association with repetition of a specific intensity pattern on a photocopy.